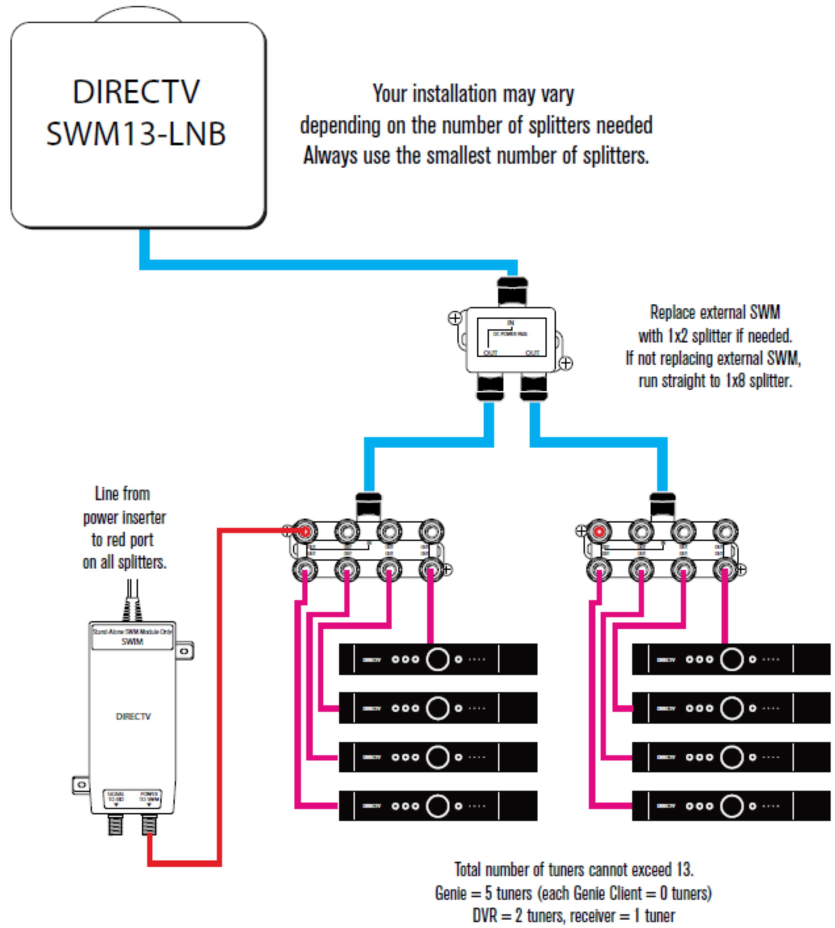
EXHIBIT X

U.S. Patent No. 8,363,681 ("the '681 Patent") Exemplary Infringement Chart

The Accused MoCA Instrumentalities are instrumentalities that DirecTV deploys to provide a whole-premises DVR network over an on-premises coaxial cable network, with devices operating with data connections compliant with MoCA 1.0, 1.1, and/or 2.0. The Accused MoCA Instrumentalities include the DirecTV HR24, DirecTV HR34, DirecTV HR44, DirecTV HR54, DirecTV HS17, DirecTV C31, DirecTV C41, DirecTV C51, DirecTV C61, DirecTV C61K and substantially similar instrumentalities. DirecTV literally and/or under the doctrine of equivalents infringes the claims of the '681 Patent under 35 U.S.C. § 271(a) by using the Accused MoCA Instrumentalities.

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
1. A method for synchronizing a plurality of nodes on a communication network, comprising:	The Accused Services are provided using at least the Accused MoCA Instrumentalities including gateway devices (including, but not limited to, the DirecTV HR24, DirecTV HR34, DirecTV HR44, DirecTV HR54, DirecTV HS17, and devices that operate in a similar matter) and client devices (including, but not limited to, the DirecTV C31, DirecTV C41, DirecTV C51, DirecTV C61, DirecTV C61K, and devices that operate in a similar manner), and substantially similar instrumentalities. The Accused MoCA Instrumentalities operate to form a communication network over an on-premises coaxial cable network as described below. The DirecTV full-premises DVR network constitutes a communication network as claimed. The DirecTV full-premises DVR network is a MoCA network created between gateway devices and client devices using the on-premises coaxial cable network. This MoCA network is compliant with MoCA 1.0, 1.1, and/or 2.0. "The MoCA Network transmits high speed multimedia data over the in-home coaxial cable infrastructure. The topology of the in-home coax infrastructure and its associated channel characteristics greatly influence all aspects of the MoCA

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the ’681 Patent
	architecture. In particular, special attention has been given to ensuring network robustness along with inherent low packet error rate performance without the use of retransmissions. This is achieved primarily through the use of full-mesh pre-equalization techniques using a form of Orthogonal Frequency Division Multiplexing (OFDM) modulation referred to herein as Adaptive Constellation 8 Multitone (ACMT).” (MoCA 2.0, Section 5) “Since the MoCA MAC is fully coordinated, every MoCA node in the network must have a clock reference that is synchronized with the System Time. In a MoCA Network, the master reference for the System Time is always the NC. All other MoCA nodes synchronize their local clocks by reading System Time stamps from the NC.” (MoCA 2.0, Section 5.3.1) DirecTV utilizes the MoCA standard to provide an on-premises DVR network over an on-premises coaxial cable network as shown below:

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the ’681 Patent
	
exchanging a local clock time between a first node and a second node over the communication network, wherein the exchange comprises:	The Accused MoCA Instrumentalities operate to exchange a local clock time between a first node and a second node over the communication network as described below.

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
	For example, by virtue of their compliance with MoCA, the Accused MoCA Instrumentalities include circuitry and/or associated software modules that exchange a local clock time between a first node and a second node over the communication network. "Since the MoCA MAC is fully coordinated, every MoCA node in the network must have a clock reference that is synchronized with the System Time. In a MoCA Network, the master reference for the System Time is always the NC. All other MoCA nodes synchronize their local clocks by reading System Time stamps from the NC." (MoCA 2.0, Section 5.3.1) "The MoCA Network is built on a fully coordinated TDMA/OFDMA channel. In order to improve Channel Time Clock (CTC) synchronization, a ranging protocol is adopted which accounts for the propagation delay between any two nodes. Once the propagation delay is known to nodes, the PHY-frame arrival time between nodes becomes more predictable, which results in benefits such as a reduced IFG requirement and a reduced CP for OFDMA PHY-frames. Ranging is performed between any pair of nodes in the network, but only the ranging between the NC and a Client Node needs signaling from NC to the Client Node." (MoCA 2.0, Section 7.4)
transmitting a first packet from the first node to the second node, wherein the first packet includes a first packet clock time set to the local clock time of the first node at transmission time, and includes a scheduled arrival clock time, and	The Accused MoCA Instrumentalities operate to transmit a first packet from the first node to the second node, wherein the first packet includes a first packet clock time set to the local clock time of the first node at transmission time, and includes a scheduled arrival clock time as described below. For example, by virtue of their compliance with MoCA, the Accused MoCA

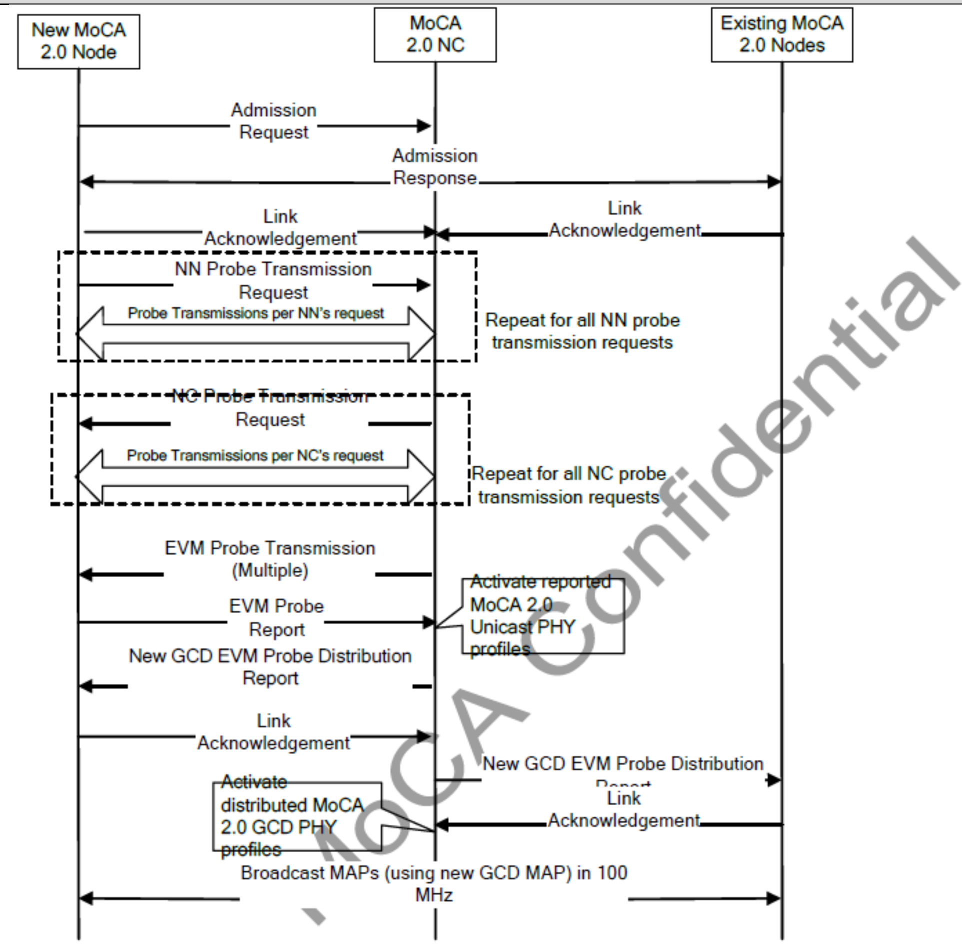
U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
	Instrumentalities include circuitry and/or associated software modules that transmit a first packet from the first node to the second node, wherein the first packet includes a first packet clock time set to the local clock time of the first node at transmission time, and includes a scheduled arrival clock time. "The NC MUST broadcast Beacon messages as described in Section 14.2.4. The Beacons transmitted by the NC in a MoCA Network are referred to as MoCA 2.0 Beacons. The format of the MoCA 2.0 Beacon is shown in Table 6-2. The MoCA 2.0 Beacon MUST be transmitted on one of the 50 MHz channels of the MoCA 2.0 100 MHz band. As with Beacon transmissions in MoCA 1.0 [7], the NC transmits unencrypted MoCA 2.0 Beacons at fixed intervals of BSI using 50 MHz Diversity Mode." (MoCA 2.0, Section 7.1.1) "The MoCA 2.0 Beacon is backward compatible with the MoCA 1.0 Beacon so that MoCA 1 nodes can receive and parse a MoCA 2.0 Beacon. MoCA 2.0 Beacons carry additional information to support MoCA 2.0 features." (MoCA 2.0, Section 7.1.1) "The NC MUST transmit Beacons at fixed intervals. This interval between two consecutive Beacon packets is called the "Beacon Synch Interval" (BSI). (See Appendix A for parameter values). Each Beacon includes fields that allow new nodes to find transmission opportunities to get admitted. Each Beacon includes a System Time stamp which new nodes use to synchronize their own reference clock with the NC for transmission and reception of packets. Time stamps are also sent in every MAC frame." (MoCA 1.0, Section 3.3)

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
	"Each node SHALL have a local 32-bit clock reference known as the Channel-Time Clock (CTC). The NC's clock, by definition, represents System Time for the network, which SHALL be counted in units of SLOT_TIMEs (±100ppm) (same as for MoCA 1). The counting-rate of the NC's System Time clock and the NC's carrier frequency MUST both be derived from a common reference frequency. Each node MUST adjust and maintain the counting-rate of its CTC to match, within ±20ppm, the clock-rate of the NC, starting from the first Beacon received." (MoCA 2.0, Section 14.7.1) "A New Node (NN) SHALL measure the Time-of-Arrival for every Beacon message, until the initial clock synchronization is concluded. After each such Beacon, the admitting node MUST immediately (before its next transmission) set its CTC count by adding to it the following differential: TRANSMIT_CLOCK – ArrivalTime where ArrivalTime is the measured Time-of-Arrival of the Beacon message according to the admitting node's CTC before the new setting, and TRANSMIT_CLOCK is from the header received from the Beacon message (i.e., the NC's transmission start time according to the NC's System Time clock)." (MoCA 2.0, Section 14.7.2)
setting the local clock time of the second node to the first packet clock time;	The Accused MoCA Instrumentalities operate to set the local clock time of the second node to the first packet clock time as described below. For example, by virtue of their compliance with MoCA, the Accused MoCA Instrumentalities include circuitry and/or associated software modules that set the local clock time of the second node to the first packet clock time.

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
	"Each node SHALL have a local 32-bit clock reference known as the Channel-Time Clock (CTC). The NC's clock, by definition, represents System Time for the network, which SHALL be counted in units of SLOT_TIMEs (±100ppm) (same as for MoCA 1). The counting-rate of the NC's System Time clock and the NC's carrier frequency MUST both be derived from a common reference frequency. Each node MUST adjust and maintain the counting-rate of its CTC to match, within ±20ppm, the clock-rate of the NC, starting from the first Beacon received." (MoCA 2.0, Section 14.7.1) "A New Node (NN) SHALL measure the Time-of-Arrival for every Beacon message, until the initial clock synchronization is concluded. After each such Beacon, the admitting node MUST immediately (before its next transmission) set its CTC count by adding to it the following differential: TRANSMIT_CLOCK – ArrivalTime where ArrivalTime is the measured Time-of-Arrival of the Beacon message according to the admitting node's CTC before the new setting, and TRANSMIT_CLOCK is from the header received from the Beacon message (i.e., the NC's transmission start time according to the NC's System Time clock)." (MoCA 2.0, Section 14.7.2)
performing a ranging method between the first and second nodes based on the local clock time exchanged, wherein the ranging method results in an estimated propagation delay between the first and second node, and wherein the ranging method comprises:	The Accused MoCA Instrumentalities operate to perform a ranging method between the first and second nodes based on the local clock time exchanged, wherein the ranging method results in an estimated propagation delay between the first and second node as described below. For example, by virtue of their compliance with MoCA, the Accused MoCA Instrumentalities include circuitry and/or associated software modules that perform a ranging method between the first and second nodes based on the local clock time

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
	exchanged, wherein the ranging method results in an estimated propagation delay between the first and second node. "The MoCA Network is built on a fully coordinated TDMA/OFDMA channel. In order to improve Channel Time Clock (CTC) synchronization, a ranging protocol is adopted which accounts for the propagation delay between any two nodes. Once the propagation delay is known to nodes, the PHY-frame arrival time between nodes becomes more predictable, which results in benefits such as a reduced IFG requirement and a reduced CP for OFDMA PHY-frames. Ranging is performed between any pair of nodes in the network, but only the ranging between the NC and a Client Node needs signaling from NC to the Client Node." (MoCA 2.0, Section 7.4) "Reference clocks at each 2.0 node SHALL be closely synchronized to the System Time broadcast by the 2.0 Network Coordinator (NC), including systematic correction for propagation delays from the NC, to ensure accurate and precise network-wide adherence to scheduled transmission periods. Tight tolerance on clock synchronization among 2.0 nodes enables minimal IFG overhead. A Ranging Protocol SHALL be utilized to: Synchronize an admitting node's clock to that of the NC; Measure propagation delays between each node and the NC; Regularly maintain all CTCs against drift relative to that of the NC." (MoCA 2.0, Section 14.7.1)
transmitting a second packet from the second node to the first node, wherein the second packet is transmitted from the second node at the scheduled arrival clock time, and wherein	The Accused MoCA Instrumentalities operate to transmit a second packet from the second node to the first node, wherein the second packet is transmitted from the second node at the scheduled arrival clock time, and wherein the second packet is received by the first node at an actual arrival clock time as described below.

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
the second packet is received by the first node at an actual arrival clock time,	For example, by virtue of their compliance with MoCA, the Accused MoCA Instrumentalities include circuitry and/or associated software modules that transmit a second packet from the second node to the first node, wherein the second packet is transmitted from the second node at the scheduled arrival clock time, and wherein the second packet is received by the first node at an actual arrival clock time. "The admission process of a new MoCA 2.0 Node depends on the operation mode of the MoCA Network that it is going to join. A MoCA 2.0 Node seeking admission to an existing network MUST be capable of delivering admission messages in MoCA 1 PHY or MoCA 2.0 PHY during the Admission Control Frames (ACF), depending on indications received in the Beacon message." (MoCA 2.0, Section 8.3) "The NN MUST use the MoCA 2.0 Admission Request transmission period (indicated in the Beacon by ACF_TYPE = 0x0F and ADDITIONAL_ACF_TYPE = 0x03) to send an Admission Request frame to the NC. All the fields of the Request MUST be filled in as shown in Table 6-11." (MoCA 2.0, Section 8.3.4.1.1)

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
	 **Figure 8-5. Messages Exchanged During Begin Node Admission State in MoCA 2.0 Mode** (MoCA 2.0, Figure 8-5)

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
	"The NC SHALL measure the Time-of-Arrival for one or more subsequent messages transmitted by the admitting node in ACF slots, which will arrive at the NC later than the NC's scheduled start time for the message(s). The measured delay represents a round-trip delay (i.e., two one-way propagation delays). The NC SHALL calculate its measured propagation delay: PropDelay = (ArrivalTime – TRANSMIT_CLOCK) / 2 where ArrivalTime is the Time-of-Arrival measured for a message transmitted by the admitting node in an ACF slot, and TRANSMIT_CLOCK is from the header received from the same message transmitted by the admitting node in an ACF slot. The formula for PropDelay (above) is written such that its value is expressed in the same units as TRANSMIT_CLOCK (i.e., SLOT_TIMEs), but the NC MUST report PropDelay in units of 10ns. The NC MAY equivalently substitute its scheduled start time in place of the received TRANSMIT_CLOCK to calculate PropDelay. The NC MAY utilize averaging or other techniques to improve the accuracy or precision of its measurement of PropDelay. The NC MUST report its measured PropDelay to the admitting node in the ACF slot (see Section 8.3.4.1.7 for MoCA 2.0 Mode networks and Section 8.3.4.2 for Mixed Mode networks). The admitting node MUST record the PropDelay reported by the NC, and MUST immediately (before its next transmission) add the PropDelay to its CTC, thereby concluding the initial clock synchronization." (MoCA 2.0, Section 14.7.2)
calculating and storing the estimated propagation delay at the first node, wherein calculating the estimated propagation delay is	The Accused MoCA Instrumentalities operate to calculate and store the estimated propagation delay at the first node, wherein calculating the estimated propagation delay is based on the scheduled arrival clock time and the actual arrival time as described below.

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the ’681 Patent
based on the scheduled arrival clock time and the actual arrival time, and	For example, by virtue of their compliance with MoCA, the Accused MoCA Instrumentalities include circuitry and/or associated software modules that calculate and store the estimated propagation delay at the first node, wherein calculating the estimated propagation delay is based on the scheduled arrival clock time and the actual arrival time. “The NC SHALL measure the Time-of-Arrival for one or more subsequent messages transmitted by the admitting node in ACF slots, which will arrive at the NC later than the NC’s scheduled start time for the message(s). The measured delay represents a round-trip delay (i.e., two one-way propagation delays). The NC SHALL calculate its measured propagation delay: PropDelay = (ArrivalTime – TRANSMIT_CLOCK) / 2 where ArrivalTime is the Time-of-Arrival measured for a message transmitted by the admitting node in an ACF slot, and TRANSMIT_CLOCK is from the header received from the same message transmitted by the admitting node in an ACF slot.” (MoCA 2.0, Section 14.7.2) “Upon reception of the EVM Probe Report from the NN containing a unicast bitloading report elements, the NC MUST compute and send a GCD Distribution Report to the NN. The NC MUST schedule an ACF frame with ACF_TYPE = 0x0F and ADDITIONAL_ACF_TYPE = 0x12 for this transmission. The GCD Distribution report is sent using the MoCA 2.0 Probe Report format described by Table 6-21, and MUST include the following five report elements: The MAP bitloading report element (TYPE = 0x1) as defined in Table 6-24 The GCD bitloading report element for NPER (TYPE = 0x2) as defined in Table 6-24

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
	The GCD bitloading report element for VLPER (TYPE = 0x2) as defined in Table 6-24 The ranging report element for the NC to report its value for PropDelay (see Section14.7.2) to the NN as defined in Table 6-26 (using SUB_TYPE = 0x0) The Unicast Fragmentation Information Report Element defined by Table 6-32" (MoCA 2.0, Section 8.3.4.1.7)
transmitting a third packet from the first node to the second node, wherein the third packet comprises the estimated propagation delay; and	The Accused MoCA Instrumentalities operate to transmit a third packet from the first node to the second node, wherein the third packet comprises the estimated propagation delay as described below. For example, by virtue of their compliance with MoCA, the Accused MoCA Instrumentalities include circuitry and/or associated software modules that transmit a third packet from the first node to the second node, wherein the third packet comprises the estimated propagation delay. "After receiving a MoCA 2.0 Admission Request frame, the NC MUST broadcast a MoCA 2.0 Admission Response frame in the ACF transmission period defined in the Beacon (ACF_TYPE = 0x0F and ADDITIONAL_ACF_TYPE = 0x04). The NC MUST follow the Node ID assignment rules in 8.3.1 to assign a Node ID to the NN. The format of the MoCA 2.0 Admission Response frame is given in Table 6-12." (MoCA 2.0, Section 8.3.4.1.1) "The NC MUST report its measured PropDelay to the admitting node in the ACF slot (see Section 8.3.4.1.7 for MoCA 2.0 Mode networks and Section 8.3.4.2 36 for Mixed Mode networks)." (MoCA 2.0, Section 14.7.2)

U.S. Patent No. 8,363,681	The Accused MoCA Instrumentalities Form a Network That Practices at Least Claim 1 of the '681 Patent
adjusting the local clock time of either the first or second node based on the estimated propagation delay, thereby resulting in a synchronized local clock time between the first and second node.	The Accused MoCA Instrumentalities operate to adjust the local clock time of either the first or second node based on the estimated propagation delay, thereby resulting in a synchronized local clock time between the first and second node as described below. For example, by virtue of their compliance with MoCA, the Accused MoCA Instrumentalities include circuitry and/or associated software modules that adjust the local clock time of either the first or second node based on the estimated propagation delay, thereby resulting in a synchronized local clock time between the first and second node. "The admitting node MUST record the PropDelay reported by the NC, and MUST immediately (before its next transmission) add the PropDelay to its CTC, thereby concluding the initial clock synchronization." (MoCA 2.0, Section 14.7.2)